**Part I**

The topic I chose: America Movies. America movies is a popular genre of films that has captured the hearts and minds of audiences around the world. Over the years, the movie industry in America has grown to become one of the largest in the world, producing numerous blockbuster hits and critically acclaimed films.

The relational database schema will provide a comprehensive overview of America movies, including information about actors, directors, genres, and studios. The data stored in the database will allow us to explore various aspects of the American movie industry, including box office performance, ratings, and the key players.

**Part II**

**The underline means primary keys**

**The red mark means foreign keys**

Here is the schema for the America Movies database:

Table 1: Movies:

movie\_id (Primary Key): the unique identifier for each movie

title: the title of the movie

release\_year: the year the movie was released

box\_office\_revenue: the amount of revenue generated by the movie

genre: the genre of that movie

run\_time: the run time of that movie

rating: the rating of that movie was giving by audiences

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| movie\_id | title | release\_year | box\_office\_revenue | genre | run\_time | rating |
| 0001 | The Dark Knight | 2008 | 1,000,000,000 | Action | 152min | 9/10 |
| 0002 | Inception | 2010 | 800,000,000 | Action | 148min | 9/10 |
| 0003 | Avengers: Endgame | 2019 | 2,700,000,000 | Action | 182min | 9/10 |
| 0004 | Titanic | 1997 | 2,000,000,000 | Drama | 194min | 8/10 |
| 0005 | The Shawshank Redemption | 1994 | 580,000,00 | Drama | 142min | 9/10 |
| 0006 | The Godfather | 1972 | 130,000,000 | Drama | 175min | 9/10 |
| 0007 | The Godfather: Part II | 1974 | 190,000,000 | Drama | 200min | 9/10 |
| 0008 | Forrest Gump | 1994 | 600,000,000 | Drama | 142min | 9/10 |
| 0009 | The Lion King | 1994 | 975,000,000 | Animation | 88min | 8/10 |
| 00010 | Toy Story | 1995 | 370,000,000 | Animation | 81min | 8/10 |
| 00011 | Beauty and the Beast | 1991 | 425,000,000 | Animation | 129min | 7/10 |

Table 2: Actors:

actor\_id (Primary Key): the unique identifier for each actor

actor\_name: the name of that actor

date\_of\_birth: the birth date of that actor

nationality: the nationality of that actor

movie\_id (Foreign Key referencing movie\_id from Movies table): a foreign key referencing the movie\_id of the Movies table and represents the highest grossing movie for that actor

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| actor\_id | actor\_name | date\_of\_birth | nationality | movie\_id |
| 1 | Christian Bale | January 30, 1974 | British | 0001 |
| 2 | Leonardo DiCaprio | November 11, 1974 | American | 0002 |
| 3 | Robert Downey Jr. | April 4, 1965 | American | 0003 |
| 4 | Kate Winslet | October 5, 1975 | British | 0004 |
| 5 | Tim Robbins | October 16, 1958 | American | 0005 |
| 6 | Marlon Brando | April 3, 1924 | American | 0006 |
| 7 | Al Pacino | April 25, 1940 | American | 0007 |
| 8 | Tom Hanks | July 9, 1956 | American | 0008 |
| 9 | Jonathan Taylor Thomas | September 8, 1981 | American | 0009 |
| 10 | Tom Hanks | July 9, 1956 | American | 00010 |
| 11 | Paige O'Hara | May 10, 1956 | American | 00011 |

Table 3: Cast:

cast\_id (Primary Key): the unique identifier for each cast member

movie\_id (Foreign Key referencing movie\_id from Movies table): a foreign key referencing the movie\_id of the Movies table and represents the movie the cast member is associated with

actor\_id (Foreign Key referencing actor\_id from Actors table): a foreign key referencing the actor\_id of the Actors table and represents the actor the cast member is associated with

character\_name: the name of the character played by that actor

billing\_order: the order of the actors in the credits of that movie

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| cast\_id | movie\_id | actor\_id | character\_name | billing\_order |
| 1 | 0001 | 1 | Batman | 1 |
| 2 | 0002 | 2 | Cobb | 1 |
| 3 | 0003 | 3 | Iron Man | 2 |
| 4 | 0004 | 4 | Rose | 1 |
| 5 | 0005 | 5 | Andy Dufresne | 1 |
| 6 | 0006 | 6 | Vito Corleone | 1 |
| 7 | 0007 | 7 | Michael Corleone | 1 |
| 8 | 0008 | 8 | Forrest Gump | 1 |
| 9 | 0009 | 9 | Young Simba | 1 |
| 10 | 00010 | 10 | Woody | 1 |
| 11 | 00011 | 11 | Belle | 1 |

Table 4: Directors

director\_id (Primary Key): the unique identifier for each director

director\_name: the name of the director

date\_of\_birth: the birth date of the director

nationality: the nationality of the director

movie\_id (Foreign Key referencing movie\_id from Movies table): a foreign key referencing the movie\_id of the Movies table and represents the highest grossing movie for the director

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| director\_id | director\_name | date\_of\_birth | nationality | movie\_id |
| 1 | Christopher Nolan | July 30, 1970 | British | 0001 |
| 2 | Christopher Nolan | July 30, 1970 | British | 0002 |
| 3 | Anthony and Joe Russo | February 3, 1970 | American | 0003 |
| 4 | James Cameron | August 16, 1954 | Canadian | 0004 |
| 5 | Frank Darabont | January 28, 1959 | Hungarian | 0005 |
| 6 | Francis Ford Coppola | April 7, 1939 | American | 0006 |
| 7 | Francis Ford Coppola | April 7, 1939 | American | 0007 |
| 8 | Robert Zemeckis | May 14, 1952 | American | 0008 |
| 9 | Rob Minkoff | August 11, 1962 | American | 0009 |
| 10 | John Lasseter | January 12, 1957 | American | 00010 |
| 11 | Gary Trousdale | June 8, 1960 | American | 00011 |

Table 5: Studios:

studio\_id (Primary Key): the unique identifier for each studio

studio\_name: the name of the studio

headquarters: the headquarters location of the studio

year\_established: the year the studio was established

movie\_id (Foreign Key referencing movie\_id from Movies table): a foreign key referencing the movie\_id of the Movies table and represents the highest grossing movie for the studio

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| studio\_id | studio\_name | headquarters | year\_established | movie\_id |
| 1 | Warner Bros. | Burbank, California | 1923 | 0001 |
| 2 | Warner Bros. | Burbank, California | 1923 | 0002 |
| 3 | Marvel Studios | Burbank, California | 1993 | 0003 |
| 4 | 20th Century Fox | Century City, California | 1935 | 0004 |
| 5 | Columbia Pictures | Culver City, California | 1924 | 0005 |
| 6 | Paramount Pictures | Hollywood, California | 1912 | 0006 |
| 7 | Paramount Pictures | Hollywood, California | 1912 | 0007 |
| 8 | 20th Century Fox | Century City, California | 1935 | 0008 |
| 9 | Walt Disney Studios | Burbank, California | 1923 | 0009 |
| 10 | Pixar | Emeryville, California | 1979 | 00010 |
| 11 | Walt Disney Studios | Burbank, California | 1923 | 00011 |

Part III:

1.Write a relational algebra expression of the form s<condition>(<table>), where <table> is one of the tables in your database…and write any English query of the form “find all…” whose result is the relational algebra expression:

Find all studios founded after the year 1930

s year\_established > 1930(Studios)

2.Write a relational algebra expression of the form p<list of attributes>(<table>), where <table> is one of the tables in your database…and write any English query of the form “find all…” whose result is the relational algebra expression:

Find all the attributes of the Movies table, including movie\_id, title, release\_year, and genre.

p<movie\_id, title, release\_year, genre>(Movies)

3.Write a relational algebra expression of the form p<list of attributes>(s<condition>(<table>)), where <table> is one of the tables in your database…and write any English query of the form “find all…” whose result is the relational algebra expression:

Find all the titles and box office revenues of the movies released in the year 2010

p<title, box\_office\_revenue>(s<release\_year = '2010'>(Movies))

4.Write a relational algebra expression of the form s<condition>(p<list of attributes>(<table>)), where <table> is one of the tables in your database…and write any English query of the form “find all…” whose result is the relational algebra expression:

Find all movies released in 2010 and display their title and box office revenue

s<release\_year = '2010'>(p<title, box\_office\_revenue>(Movies))